

**CLAIMS**

1. (currently amended) A method of automatically labeling a time axis of a graph that includes time based data comprising :

generating a plurality of time labels, where each time label in the plurality of time labels corresponds to hierarchical levels of time, by extracting and analyzing time label information from input data comprising informational data and corresponding time data labels;

determining which of the time labels in the plurality of hierarchical levels of time fit along the time axis based on the informational data;

for each time label in the plurality of time labels that fits along the time axis based on the information data, including the time label in an initial time label set;

creating a multi-level data structure;

storing the time label labels in the initial time label set information in the multi-level data structure;

processing the multi-level data structure to refine the time labels;

generating multi-level time labels from the time labels that are stored in the multi-level data structure, each multi-level time label comprising a plurality of rows of time labels; and

applying the generated label to the time axis of a graph so that it serves as a label for that axis.

2. (original) The method of automatically labeling a time axis of a graph according to claim 1 further comprising the step of assigning indexes to each of the time labels in the multi-level data structure.

3. (original) The method of automatically labeling a time axis of a graph according to claim 1 further comprising the steps of:

generating axis markers; and

labeling the time axis of the graph with the axis markers.

4. (original) The method of automatically labeling a time axis of a graph according to claim 1 further comprising the step of assigning indexes to each of the time labels in the multi-level data structure.

5. (currently amended) The method of automatically labeling a time axis of a graph according to claim 1 whereas the step of generating time labels comprises the steps of:

- (a) creating an initial set of time labels;
- (b) determining whether the initial set of time labels will fit along the time axis and if the initial set of time labels fits along the time axis proceeding to step (g);
- creating an abbreviated set of time labels;

(d) determining whether the abbreviated set of time labels will fit along the time axis and if the abbreviated set of time labels fits along the time axis proceeding to step

(g);

(e) creating a subset of time labels;

(f) determining whether the subset of time labels will fit along the time axis and if the subset of time labels does not fit along the time axis proceeding to step (e); and

(g) generating the abbreviated set of time labels.

6. (original) The method of automatically labeling a time axis of a graph according to claim 5 whereas the step of determining whether the initial set of time labels will fit along the time axis comprises:

summing the length of each time label in the initial set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

7. (original) The method of automatically labeling a time axis of a graph according to claim 5 whereas the step of determining whether the abbreviated set of time labels will fit along the time axis comprises:

summing the length of each time label in the abbreviated set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

8. (original) The method of automatically labeling a time axis of a graph according to claim 5 whereas the step of determining whether the subset of time labels will fit along the time axis comprises:

summing the length of each time label in the subset of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

9. (original) The method of automatically labeling a time axis of a graph according to claim 1 whereas the step of processing the multi-level data structure to refine the time labels comprises extending the precision of the time labels.

10. (original) The method of automatically labeling a time axis of a graph according to claim 1 whereas the step of processing the multi-level data structure to refine the time labels comprises merging the levels in the multi-level data structure.

11. (currently amended) A method of automatically labeling a time axis of a graph that includes time based data comprising:

generating a plurality of time labels, where each time label in the plurality of time labels corresponds to hierarchical levels of time, by extracting and analyzing time label information from input data comprising informational data and corresponding time data labels;

determining which of the time labels in the plurality of hierarchical levels of time fit along the time axis based on the informational data;  
for each time label in the plurality of time labels that fits along the time axis based on the information data, including the time label in an initial time label set;  
generating a multi-level data structure to store the time labels;  
populating the multi-level data structure with the time labels;  
refining the time labels in the multi-level data structure;  
generating multi-level time labels from the time labels that are stored in the multi-level data structure, each multi-level time label comprising a plurality of rows of time labels;  
defining axis markers that will be displayed on the time axis; and  
applying the generated label to the time axis so that it serves as a label for that axis.

12. (cancelled)
13. (currently amended) A system for performing a method automatically labeling a time axis of a graph that includes time based data comprising:  
a processor operable to execute computer program instructions; and  
a memory operable to store computer program instructions executable by the processor, for performing the steps of:

generating a plurality of time labels, where each time label in the plurality of time labels corresponds to hierarchical levels of time, by extracting and analyzing time label information from input data comprising informational data and corresponding time data labels;

determining which of the time labels in the plurality of hierarchical levels of time fit along the time axis based on the informational data;

for each time label in the plurality of time labels that fits along the time axis based on the information data, including the time label in an initial time label set creating a multi-level data structure;

storing the time label labels in the initial time label set information in the multi-level data structure;

processing the multi-level data structure to refine the time labels;

generating multi-level time labels from the time labels that are stored in the multi-level data structure, each multi-level time label comprising a plurality of rows of time labels; and

applying the generated label to the time axis of a graph so that it serves as a label for that axis.

14. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 further comprising the step of assigning indexes to each of the time labels in the multi-level data structure.

15. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 further comprising the steps of:

- generating axis markers; and
- labeling the time axis of the graph with the axis markers.

16. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 further comprising the step of:

- assigning indexes to each of the time labels in the multi-level data structure.

17. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 whereas the step of generating time labels comprises the steps of:

- (a) creating an initial set of time labels;
- (b) determining whether the initial set of time labels will fit along the time axis and if the initial set of time labels fits along the time axis proceeding to step (g);
- (c) creating an abbreviated set of time labels;
- (d) determining whether the abbreviated set of time labels will fit along the time axis and if the abbreviated set of time labels fits along the time axis proceeding to step (g);
- (e) creating a subset of time labels;
- (f) determining whether the subset of time labels will fit along the time axis and if the subset of time labels does not fit along the time axis proceeding to step (c); and

(g) generating the set of time labels.

18. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 17 whereas the step of determining whether the initial set of time labels will fit along the time axis comprises:

summing the length of each time label in the initial set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

19. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 17 whereas the step of determining whether the abbreviated set of time labels will fit along the time axis comprises:

summing the length of each time label in the abbreviated set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

20. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 17 whereas the step of determining whether the subset of time labels will fit along the time axis comprises:

summing the length of each time label in the subset of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

21. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 whereas the step of processing the multi-level data structure to refine the time labels comprises extending the precision of the time labels.
22. (previously presented) A system for performing a method of automatically labeling a time axis of a graph according to claim 13 whereas the step of processing the multi-level data structure to refine the time labels comprises merging the levels in the multi-level data structure.
23. (currently amended) A computer program product for performing a method of automatically labeling a time axis of a graph that includes time based data process in a system, comprising:
  - a computer readable medium; and
  - computer program instructions, recorded on the computer readable medium, executable by a processor, for performing the steps of:
    - generating a plurality of time labels, where each time label in the plurality of time labels corresponds to hierarchical levels of time, by extracting and analyzing time label information from input data comprising informational data and corresponding time data labels;

determining which of the time labels in the plurality of hierarchical levels of time fit along the time axis based on the informational data;  
for each time label in the plurality of time labels that fits along the time axis based on the information data, including the time label in an initial time label set  
creating a multi-level data structure;  
storing the time label labels in the initial time label set information in the multi-level data structure;  
processing the multi-level data structure to refine the time labels;  
generating multi-level time labels from the time labels that are stored in the multi-level data structure, each multi-level time label comprising a plurality of rows of time labels; and  
applying the generated label to the time axis of a graph so that it serves as a label for that axis.

24. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 further comprising the step of assigning indexes to each of the time labels in the multi-level data structure.

25. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 further comprising the steps of:

generating axis markers; and

labeling the time axis of the graph with the axis markers.

26. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 further comprising the step of:

assigning indexes to each of the time labels in the multi-level data structure.

27. (currently amended) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 whereas the step of generating time labels comprises the steps of:

- (a) ~~creating an initial set of time labels;~~
- (b) ~~determining whether the initial set of time labels will fit along the time axis and if the initial set of time labels fits along the time axis proceeding to step (g);~~
- creating an abbreviated set of time labels;
- (d) determining whether the abbreviated set of time labels will fit along the time axis and if the abbreviated set of time labels fits along the time axis proceeding to step (g);
- (e) ~~creating a subset of time labels;~~
- (f) ~~determining whether the subset of time labels will fit along the time axis and if the subset of time labels does not fit along the time axis proceeding to step (e); and~~
- (g) generating the abbreviated set of time labels.

28. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 27 whereas the step of determining whether the initial set of time labels will fit along the time axis comprises:

summing the length of each time label in the initial set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

29. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 27 whereas the step of determining whether the abbreviated set of time labels will fit along the time axis comprises:

summing the length of each time label in the abbreviated set of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

30. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 27 whereas the step of determining whether the subset of time labels will fit along the time axis comprises:

summing the length of each time label in the subset of time labels and an inter-label spacing constant; and

comparing the sum with the length of the time axis.

31. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 whereas the step of processing the multi-level data structure to refine the time labels comprises extending the precision of the time labels.

32. (previously presented) A computer program product for performing a method of automatically labeling a time axis of a graph according to claim 23 whereas the step of processing the multi-level data structure to refine the time labels comprises merging the levels in the multi-level data structure.